

WHAT IS CLAIMED IS:

1. ULSI wiring in which wiring layers are separately formed via a diffusion prevention layer with an insulating interlayer portion made of SiO_2 and a capping layer is formed on the wiring layers, wherein the capping layer is made of one plating film selected from the group consisting of nickel-tungsten-phosphorus, nickel-rhenium-phosphorus, and nickel-boron.
2. The ULSI wiring as claimed in claim 1, wherein said nickel-boron plating film contains a boron content of between about 0.1-10 wt.% and a nickel content of between about 90-99.9 wt.%.
3. The ULSI wiring as claimed in claim 1, wherein said nickel-tungsten-phosphorus plating film contains a tungsten content of between about 40-80 wt.% , a phosphorus content of between about 0.1-1.0 wt.%, and a residual of nickel.
4. The ULSI wiring as claimed in claim 1, wherein said nickel-rhenium-phosphorus plating film contains a rhenium content of between about 40-80 wt.% , a phosphorus content of between about 0.1-1.0 wt.%, and a residual of nickel.
5. The ULSI wiring as claimed in claim 1, wherein the wiring layer is separately formed via a diffusion prevention layer with the first insulating layer.
6. The ULSI wiring as claimed in claim 1, wherein the second insulating interlayer is also formed on at least a portion of said first insulating interlayer.

7. Ultra-Large Scale Integrated (ULSI) wiring comprising a first insulating interlayer having at least one of trench and via formed on the surface of the first insulating layer, a diffusion prevention layer formed above an inner surface of the at least one of trench and via with a space therein, a wiring layer formed in the space of the diffusion prevention layer, and a second insulating layer covered over at least the wiring layer,

wherein the diffusion prevention layer is made of a plating film selected from the group consisting of a nickel-tungsten-phosphorus plating film, a nickel-rhenium-phosphorus plating film, a nickel-boron film, a cobalt-tungsten-phosphorus film, a cobalt-tungsten-boron film, and a cobalt metal film.

8. Ultra-Large Scale Integrated (ULSI) wiring as claimed in claim 7, wherein said diffusion prevention layer contains at least one of silicon and carbon.

9. Ultra-Large Scale Integrated (ULSI) wiring as claimed in claim 7, further comprising an adhesion layer containing at least one of silicon and carbon between said first insulating layer and said diffusion prevention layer.

10. Ultra-Large Scale Integrated (ULSI) wiring as claimed in claim 9, wherein said adhesion layer is substantially made of silane compound layer.

11. Ultra-Large Scale Integrated (ULSI) wiring as claimed in claim 10, wherein said silane compound layer is a monomolecular layer

containing an amino group.

12. Ultra-Large Scale Integrated (ULSI) wiring comprising a first insulating interlayer having at least one of trench and via formed on the surface of the first insulating layer, a diffusion prevention layer formed above an inner surface of the at least one of trench and via with a space therein, a wiring layer formed in the space of the diffusion prevention layer, a capping layer formed directly on the wiring layer and the diffusion protecting layer, and a second insulating layer covered over the capping layer,

wherein at least one of the diffusion prevention layer and the capping layer is made of a plating film selected from the group consisting of a nickel-tungsten-phosphorus plating film, a nickel-rhenium-phosphorus plating film, a nickel-boron film, a cobalt-tungsten-phosphorus film, a cobalt-tungsten-boron film, and a cobalt metal film.

13. Ultra-Large Scale Integrated (ULSI) wiring as claimed in claim 12, wherein said diffusion prevention layer contains at least one of silicon and carbon.

14. Ultra-Large Scale Integrated (ULSI) wiring as claimed in claim 12, further comprising an adhesion layer containing at least one of silicon and carbon between said first insulating layer and said diffusion prevention layer.

15. Ultra-Large Scale Integrated (ULSI) wiring as claimed in claim 14, wherein said adhesion layer is substantially made of silane compound layer.

16. Ultra-Large Scale Integrated (ULSI) wiring as claimed in claim 15, wherein said adhesion layer contains carbon more than silicon in an amount.

17. Ultra-Large Scale Integrated (ULSI) wiring as claimed in claim 12, wherein said silane compound layer is a monomolecular layer containing an amino group.